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Indian Standard

TEXTILE DYESTUFFS — EVALUATION OF DISPERSE DYES, VAT DYES AND PIGMENTS MIGRATION

ICS 59.040

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1997

Price Group 1

Dyestuffs Sectional Committee, TX 17

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Dyestuffs Sectional Committee had been approved the Textile Division Council.

Vat dye, vat/disperse dye combinations and pigments are applied on cotton or polyester/cotton on a large scale by padding, drying and fixation. High speed continuous or semi-continuous methods require a sufficiently small particle size for optimum fixation of the dyes. However, small particle size increases the potential of undesirable migration during drying. In case drying conditions are not constant and/or uniform, uneven migration may occur, causing shade variations during a run or shade differences between the face and back or between the side and centre of the fabric.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

TEXTILE DYESTUFFS — EVALUATION OF DISPERSE DYES, VAT DYES AND PIGMENTS MIGRATION

1 SCOPE

This standard describes a method for assessing the migration propensity (degree of migration) of the disperse dyes, vat dyes and pigments and which may also contain different types and amounts of migration inhibitors.

The test method may be used to compare the migration propensity of dyes, and the effect on migration of different types of migration inhibitors, thickeners and electrolyte.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
768 : 1982	Method for evaluating change in colour (*first revision*)
6359 : 1971	Method for conditioning of textiles

3 TERMINOLOGY

3.1 For the purpose of this standard the following definitions shall apply.

3.1.1 *Dye*

A colourant applied to or formed in a substrate, via the molecularly dispersed state, which exhibits some degree of permanence.

3.1.2 *Pigment*

A colourant in particulate form which is insoluble in a substrate, but which can be dispersed in the substrate to modify its colour.

3.1.3 *Migration*

Movement of a chemical, dye or pigment between fibres within a substrate or between substrates due to capillary forces.

4 PRINCIPLE

Fabric impregnated with dye alone or with dye and auxiliaries, is dried at room temperature.The fabric is partially covered with a watch glass permitting differential drying to occur and therefore, migration to occur. Degree of migration is evaluated by visual examination, or by reflectance measurements of the covered and uncovered areas.

5 APPARATUS

5.1 Laboratory padder.

5.2 Glass plate (60 cm × 35 cm).

5.3 Watch glass (9 cm) with 2.2 cm arch punch.

5.4 Grey scale for colour change (*see* IS 768).

5.5 Colourimeter or spectrophotometer.

6 TEST SPECIMEN

6.1 Distilled water.

6.2 Dyes in concentration desired.

6.3 Auxiliaries in concentrations required.

6.4 Fabric

A conditioned 15 cm × 30 cm swatch of substrate is desired (*see* IS 6359).

For disperse dyes, vat dyes and pigments, generally the preferred fabric is 65/35 polyester/cotton gabardine or heavy-twill fabric, heat set, bleached and mercerised.For soluble dyes with affinity to cellulose (reactive dyes) a bleached and mercerised 100 percent cotton gabardine or heavy twill fabric should be used. However, any other fabric intended for use on a continuous dye range may be chosen.

6.5 Wet pickup; whatever is convenient for the substrate under test but must be specified.

7 PROCEDURE

A 15 cm × 30 cm swatch of fabric is impregnated at room temperature in a bath containing dye (and auxiliaries), then padded to obtain desired wet pickup by adjusting the pressure at the nip of pad rolls. Generally the wet pickup is 60 percent, but may be adjusted to simulate wet pickup of a particular fabric to be run on a particular range.

Calculate wet pickup as weight gained by the substrate at ambient conditions after padding, from the following equation:

$$\text{Percentage wet pickup} = 100 \left(\frac{A}{B} - 1 \right)$$

where

A = weight after padding, and

B = weight before padding.

Immediately after padding, the fabric is placed on a flat glass plate. A 9-cm watch glass is placed on the fabric as shown in Fig. 1 and the fabric is dried at room temperature. The watch glass is removed and the degree of particulate migration is estimated by comparison of the dye concentration in the area of the fabric which was covered by the watch glass to the concentration in the rest of the fabric.

8 EVALUATION

8.1 Visual

8.1.1 Compare the depth of colour under the watch glass to the depth of colour of the rest of the fabric by references to the grey scale for colour change (*see* IS 768).

8.2 Reflectance Measurements

8.2.1 Determine the wavelength for measurement using a reference area of the untreated fabric. Make reflectance measurements on the area of fabric under the watch glass and on the rest of fabric using a spectrophotometer. Convert these values to K/S using the following equation:

$$\frac{K}{S} = (1-R)^2/2R$$

where

R is the reflectance factor at the wavelength of maximum absorption.

Calculate the migration percent to a nearest 1 percent from the following equation :

$$\text{Percent migration} = 100\ [1-(K/S)_a/(K/S)_b]$$

where

$(K/S)_a$ is the K/S value of the tested area.

9 REPORT

The test report shall include the following:

a) The substrate, the pad liquor composition including dyes, chemicals and auxiliaries and the wet pickup expressed as a percentage adjunct based on the untreated substrate.

b) Room temperature, and relative humidity.

c) Report the visual assessment on a scale of 1-5 by the grey scale for colour change:

Grade 5 — No migration

Grade 4 — Slight migration

Grade 3 — Medium migration

Grade 2 — Severe migration

Grade 1 — Very severe migration

d) Report reflectance measurements as percentage particulate migration using the outer dyed area as a standard.

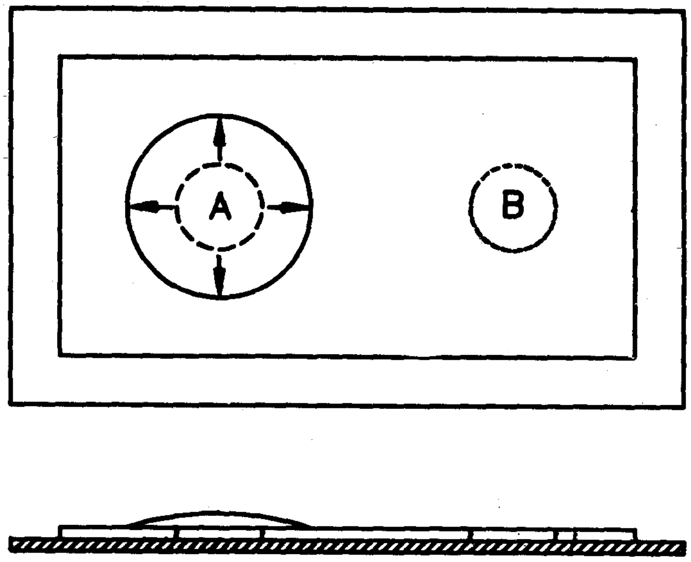

FIG. 1 LAYOUT OF APPARATUS FOR INDUCING COLOURANT MIGRATION

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